

**WHAT IS CLAIMED IS:**

1. A laminate-type piezoelectric device comprising:

a ceramic layer as printed; and

an internal electrode layer as printed which is laminated  
5 on the ceramic layer as printed, having a lower surface flat  
along a surface of the ceramic layer as printed, and having an  
edge sidewall in an tip portion having an inclined surface making  
an acute angle with respect to the surface of the underlying  
ceramic layer as printed,

10 wherein the ceramic layers as printed and the internal  
electrode layers as printed are alternately laminated on each  
other.

2. A laminate-type piezoelectric device comprising:

ceramic layers as printed and internal electrode layers  
15 as printed, alternately laminated on each other,

wherein the ceramic layer as printed is made of a  
piezoelectric material, the internal electrode layer as printed  
has an end portion formed to be gradually thinner toward an edge  
thereof and an approximate line makes an angle of  $2^{\circ}$  to  $30^{\circ}$  with  
20 respect to a surface of the ceramic layer as printed, the  
approximate line being five times a length of an average thickness  
of the internal electrode layer as printed from a tip of an upper  
side of the edge portion of the internal electrode layer as printed  
and being obtained by the least-squares method.

25 3. The laminate-type piezoelectric device according to claim  
1, wherein the ceramic layer as printed has surface roughness

(arithmetic mean roughness Ra) of 0.05  $\mu\text{m}$  to 0.5  $\mu\text{m}$ .

4. The laminate-type piezoelectric device according to claim 2, wherein the ceramic layer as printed has surface roughness (arithmetic mean roughness Ra) of 0.05  $\mu\text{m}$  to 0.5  $\mu\text{m}$ .

5 5. A laminate-type piezoelectric device comprising:

ceramic layers as printed and internal electrode layers as printed, alternately laminated on each other,

wherein the internal electrode layer as printed has electrode thin films laminated in a multistage manner so as to  
10 be gradually thinner toward an edge thereof.

6. A method for manufacturing a laminate-type piezoelectric device, comprising:

a first ceramic printing step of printing and forming a ceramic layer as nonfired;

15 an electrode printing step of printing an electrode material paste on a surface of the ceramic layer as nonfired to form an electrode layer as nonfired on the surface of the ceramic layer as nonfired, the electrode layer as nonfired having an edge portion in which a  $2^\circ$  to  $30^\circ$  angle is made by an approximate  
20 line which is obtained by the least-squares method and is five times a length of an average thickness from a tip of an upper side of the edge portion;

a second ceramic printing step of printing and forming another ceramic layer as nonfired on the ceramic layer as nonfired  
25 having the electrode layer as nonfired formed thereon; and

a step of firing a lamination body formed by sequentially

repeating the first ceramic printing step, the electrode printing step and the second ceramic printing step.

7. The method for manufacturing a laminate-type piezoelectric device according to claim 6, wherein the ceramic layer as nonfired  
5 is made of a piezoelectric material.

8. The method for manufacturing a laminate-type piezoelectric device according to claim 6, wherein the first and second ceramic layers as printed has surface roughness (arithmetic mean roughness: Ra) prepared to be 0.05  $\mu\text{m}$  to 0.5  $\mu\text{m}$ .

10 9. The method for manufacturing a laminate-type piezoelectric device according to claim 6, wherein the electrode material paste forming the edge portion of the electrode layer as nonfired is set lower in viscosity than the electrode material paste forming an intermediate portion thereof.

15 10. The method for manufacturing a laminate-type piezoelectric device according to claim 8, wherein the electrode material paste has a viscosity of 30 to 3000 Pa $\cdot$ sec.

11. The method for manufacturing a laminate-type piezoelectric device according to claim 10, wherein

20 the electrode material paste has a ratio of a binder therein prepared at 1 wt% to 10 wt%,

the electrode material paste has a ratio of a solvent therein prepared at 5 wt% to 20 wt% and

the electrode material paste has metal particles of a  
25 mean particle diameter in prepared at 0.1  $\mu\text{m}$  to 4  $\mu\text{m}$ .